Evaluating ChatGPT for Software Testing
Master's Thesis/ Guided Research

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Starting date: flexible

Context
Generative AI focuses on creating novel and unique content with pre-trained data [2]. This content can encompass a wide range of forms, spanning from written literature, images, music, academic papers, to even cinematic works. Generative AI harnesses the power of Natural Language Processing (NLP), enabling it to perform tasks such as speech-to-text conversion, part-of-speech tagging within textual content, recognizing named entities, extracting sentiment or emotions from text, and generating natural language [2]. Numerous Generative AI programs have been introduced to the market, with one of the most prominent examples being ChatGPT\(^1\).

Cámara et al. [3] have conducted an investigation into ChatGPT’s performance in generating UML models that are both syntactically and semantically accurate. Ozkaya [6] has delved into the ramifications of large language models (LLMs) within the field of software engineering. Ahmad et al. [1] have explored the role of ChatGPT as a software development bot that collaborates with human architects to automate the software system design process. Kim [4] has highlighted ChatGPT’s capabilities in various software development tasks. Luu et al. have evaluated ChatGPT’s capabilities for mutation testing [5].

Goal
The goal of this thesis is to evaluate ChatGPT’s capabilities for generating test cases and assisting developers in their testing process.

Working Plan
1. Conduct literature research on related works.
2. Create methodology for writing prompts and evaluating the results.
3. Find system(s) that should be tested (single methods/ classes/ services vs. multiple services).
5. Evaluate the results.
6. Write the thesis report.

Deliverables
• Extensive description of methodology.
• Overview of prompts and answers of ChatGPT.
• Results of the evaluation.
• Final thesis written in conformance with TUM guidelines.
• Presentation of the work at the chair after the submission.

Application for Thesis
Please apply for this thesis topic with your CV, grade report, and a short motivation, why you are interested in this topic. Based on these documents, we will invite some students for a personal meeting to see if the topic fits the student. To have completed the lecture “Advanced Topics of Software Testing” with a 2.0 or better is highly recommended for this topic.

\(^1\)https://openai.com/blog/chatgpt
References


